

REMARKS

The Office Action dated November 20, 2002 has been received and carefully considered. The above amendments and the following remarks are being submitted as a full and complete response to the Office Action.

Claims 1 to 20 are currently pending in the present application. As a result of the above amendments, claims 2-4, 8-10 and 15-17 have been cancelled and new claims 21-47 have been added. Thus, claims 1, 5-7, 11-14, 18-20 and 21-47 are presented for reconsideration.

Each of the original independent claims of the application has been amended to emphasize the following distinguishing features of the present invention.

1. A plurality of pre-stored textures are each mapped respectively onto a plurality of polygons making up an object;

2. Plural textures are moved and then restored in the texture rendering area, and the moved textures are mapped again (i.e., remapped) onto the plurality of polygons; and

3. At least one of the plurality of textures is moved in a different direction from another one of the plurality of textures.

The significance of these amendments shall be discussed in greater detail below.

With respect to the specification objection, a new title of the invention has been proposed which clearly states the object of the present invention as defined in the claims. The specification has been reviewed for any readily apparent grammatical or idiomatic errors. It is respectfully submitted that the specification is intelligible and in adequate form.

Claims 1, 6-7, 12-13 and 18-20 were rejected under 35 U.S.C. § 102 as being anticipated by Rice.

Admittedly, Rice is a relevant reference that is directed to a similar goal as the present invention. However, the

technique of Rice, which relies on successively generating texture maps from a plurality of graphical components, is different from the mapping technique of the claimed invention. The features of the amended claims would not have been known or obvious from the cited prior art.

More specifically, Rice concerns a method for creating a texture map, in which graphical components of the texture map are moved and repeatedly applied in a toroidal pattern to create a moving image. Thus, according to Rice, it is the graphical components of a texture map that are moved, not the texture itself, and each time the graphical components are moved, the texture map must be recreated before it can be mapped onto a surface in respective display frames. Moreover, Rice proposes only one direction of movement, namely a toroidal pattern, for all of the graphical components in the successively created texture maps.

By contrast, in the present invention, a plurality of different textures are created ahead of time and stored in a texture rendering area of an image memory, whereas a plurality of polygons are stored in a separate display rendering area. The preexisting and pre-stored textures are then mapped to the respective polygons making up an object.

Unlike Rice, the present invention does not require the recreation of a texture with each successive mapping. Rather, the preexisting stored textures need only be moved a given interval, restored, and the moved textures are then remapped to their given polygons.

Finally, since Rice does not disclose or suggest mapping, moving and remapping of entire textures onto a plurality of polygons, there can be no suggestion in the cited reference of moving the textures in different directions for different polygons. For example, as shown in Fig. 5, the texture images (6), (19), (12) and (16) are moved in a different direction than the textures in the other polygons. Furthermore, the texture images (6), (19), (12) and (16) are each moved in two different

directions, a feature which likewise is not shown or suggested in Rice.

Claims 2, 4, 8, 10, 14 and 16 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Rice in view of Nomi et al.

The Examiner contends that Nomi et al. discloses the feature of using semitransparent textures in texture mappings for producing a water surface. However, even if Rice were modified to create a semitransparent texture mapping, the other deficiencies of the cited reference would still be absent. Since Nomi et al. does not make up for the main deficiencies of the primary reference discussed above, the indicated dependent claims are allowable at least for the same reasons as the amended independent claims.

Claims 3, 5, 9, 11, 15 and 17 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Rice and Nomi et al., taken further in view of Blinn.

The Examiner asserts that Blinn discloses the feature of arranging semitransparent or transparent objects in multiple layers. However, even if Rice were modified to create multiple layers of semitransparent texture mappings, the other deficiencies of the cited reference would still be absent. Since Blinn does not make up for the main deficiencies of the primary reference discussed above, the indicated dependent claims are allowable at least for the same reasons as the amended independent claims.

New Claims 29 to 47. New claims have been presented, which are broader in scope than the amended claims discussed above, but which nonetheless present allowable subject matter over the cited prior art of record. In particular, new independent claims 29, 32, 34, 37, 39, 42, 44 and 46 do not recite the remapping step or the feature in the moving step that at least one of the plurality of semitransparent textures is moved in a different direction, as recited in the other independent claims.

The new claims set forth steps or means for mapping a plurality semitransparent textures onto respective surfaces of a plurality of semitransparent or transparent polygons which make

up an object, and moving the plurality of semitransparent textures simulatively in an arbitrary direction.

The new claims are also allowable over the cited prior art for the following reasons.

As described above, Rice is a texture generating method, wherein the same single texture is regenerated successively, with the positions of the graphical components in the texture changing each time. By contrast, the claimed invention uses a plurality of pre-stored textures, wherein each of the plurality of textures is moved. Thus, the present invention is not texture generating method as in Rice.

More specifically, Rice discloses moving the "graphical components" (30, 32, 34, 36) of a single texture map (38). Each time the texture is created in successive frames, the positions of the graphical components making up the texture map are moved. In discussing how the invention operates, only a single texture map (38 or 68) is referred to in Rice and the texture map itself is not moved. Rather, only the *graphical components within the texture map* are moved.

Rice further discloses 'that the location where the graphical component will appear in the single texture map is determined from a non-linear combination of an offset vector and the prior location of the graphical component (Step 74, Fig. 8). A basic understanding of how the graphical components are moved is shown in FIGS. 3A and 3B, in conjunction with the statement in the specification, which says, "As illustrated in FIG. 3A, the graphical components 30-36 are applied to the texture map 38 in a sequence of toroidally incremented locations, which will cause the graphical components to wrap around the texture map as they are applied." (See, col. 4, lines 6-15.)

However, there is absolutely no statement or suggestion in Rice of using multiple textures, wherein each of a plurality of textures is moved, as in the claimed invention, for enabling a highly natural looking display of fluid motion such as a flowing river or the like.

All matters in the Office Action have been fully responded to. Thus, for the foregoing reasons, it is respectfully submitted that claims 1, 5-7, 11-14, 18-20 and 21-28, together with new claims 29-47, are in condition for allowance, and an early notice of allowance of the claims is requested.

No fees are due. Notwithstanding, should it be deemed that fees, or deficiencies in fees, are required in connection with this or any accompanying communication, such amounts may be charged to the Attorney's Deposit Account No. 07-2519.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Paul A. Guss', with a long horizontal flourish extending to the right.

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AMENDMENTS

(Version with Markings to Show Changes Made)

IN THE TITLE

Please replace the current title with the following new title:

-- METHOD OF AND APPARATUS FOR RENDERING AN IMAGE
SIMULATING FLUID MOTION, WITH RECORDING MEDIUM AND PROGRAM
THEREFOR --

IN THE CLAIMS

Cancel claims 2-4, 8-10 and 15-17.

1. (Amended) A method of rendering an image comprising the steps of:

~~{moving a texture simulatively on at least one object thereby to render an image}~~

mapping a plurality semitransparent textures onto respective surfaces of a plurality of semitransparent or transparent polygons which make up an object;

moving said plurality of semitransparent textures simulatively in an arbitrary direction; and

remapping the plurality of semitransparent textures, which have been moved, onto said respective surfaces of the plurality

of semitransparent or transparent polygons which make up said object.

wherein in said moving step, at least one of said plurality of semitransparent textures is moved in a different direction from another one of said plurality of textures.

5. (Amended) A method according to claim 1 ~~{claim 4}~~, wherein said moving step further comprises the step of arranging said ~~{one or more}~~ plurality of semitransparent or transparent polygons in one or more multiple layers.

6. (Amended) A method of processing an image, comprising the steps of:

storing a plurality of texture images in a texture rendering area of an image memory;

storing a plurality of polygons in a display rendering area of said image memory based on at least said texture images; ~~{~~ and

mapping the texture images respectively onto said polygons;

moving the texture images stored in said texture rendering area in an arbitrary direction and restoring the moved texture images in said texture rendering area; and

remapping the moved texture images respectively onto the polygons stored in said display rendering area.

wherein in said moving step, at least one of said plurality of semitransparent textures is moved in a different direction from another one of said plurality of textures.

7. (Amended) An apparatus for rendering an image comprising:

~~{rendering means for moving a texture simulatively on at least one object thereby to render an image}~~

texture mapping means for mapping a plurality semitransparent textures onto respective surfaces of a plurality of semitransparent or transparent polygons which make up an object;

texture moving means for moving said plurality of semitransparent textures simulatively in an arbitrary direction;
and

texture remapping means for remapping the plurality of semitransparent textures, which have been moved, onto said respective surfaces of the plurality of semitransparent or transparent polygons which make up said object.

wherein said texture moving means moves at least one of said plurality of semitransparent textures in a different direction from another one of said plurality of textures.

11. (Amended) An apparatus according to claim 7 ~~{claim 10}~~, wherein said rendering means comprises:

object setting means for arranging said ~~{one or more}~~ plurality of semitransparent or transparent polygons in one or more multiple layers.

12. (Amended) An apparatus for processing an image, comprising:

texture rendering means for storing a plurality of texture images in a texture rendering area of an image memory;

image rendering means for storing a plurality of polygons in a display rendering area of said image memory based on at least said texture images; ~~{, and}~~

texture mapping means for mapping the texture images respectively onto said polygons;

texture moving means for moving the texture images stored in said texture rendering area in an arbitrary direction and restoring the moved texture images in said texture rendering area; and

wherein said texture mapping means comprises means for remapping the moved texture images respectively onto the polygons stored in said display rendering area, and

wherein said texture moving means moves at least one of said plurality of semitransparent textures in a different direction from another one of said plurality of textures.

13. (Amended) A recording medium storing a program and data, said program comprising the steps of:

~~{moving a texture simulatively on at least one object thereby to render an image}~~

mapping a plurality semitransparent textures onto respective surfaces of a plurality of semitransparent or transparent polygons which make up an object;

moving said plurality of semitransparent textures
simulatively in an arbitrary direction; and

remapping the plurality of semitransparent textures, which
have been moved, onto said respective surfaces of the plurality
of semitransparent or transparent polygons which make up said
object.

wherein in said moving step, at least one of said plurality
of semitransparent textures is moved in a different direction
from another one of said plurality of textures.

17. (Amended) A recording medium according to claim 13
~~{claim 15}~~, wherein said moving step further comprises the step
of arranging said ~~{one or more}~~ plurality of semitransparent or
transparent polygons in one or more multiple layers.

18. (Amended) A recording medium storing a program and
data, said program comprising the steps of:

storing a plurality of texture images in a texture
rendering area of an image memory;

storing a plurality of polygons in a display rendering area
of said image memory based on at least said texture images; ~~{~~
~~and}~~

mapping the texture images respectively onto said polygons;

moving the texture images stored in said texture rendering
area in an arbitrary direction and restoring the moved texture
images in said texture rendering area; and

remapping the moved texture images respectively onto the polygons stored in said display rendering area,

wherein in said moving step, at least one of said plurality of semitransparent textures is moved in a different direction from another one of said plurality of textures.

19. (Amended) A program which can be read and executed by a computer, comprising the steps of:

~~{moving a texture simulatively on at least one object thereby to render an image}~~

mapping a plurality semitransparent textures onto respective surfaces of a plurality of semitransparent or transparent polygons which make up an object;

moving said plurality of semitransparent textures simulatively in an arbitrary direction; and

remapping the plurality of semitransparent textures, which have been moved, onto said respective surfaces of the plurality of semitransparent or transparent polygons which make up said object.

wherein in said moving step, at least one of said plurality of semitransparent textures is moved in a different direction from another one of said plurality of textures.

20. (Amended) A program comprising the steps of:

storing a plurality of texture images in a texture rendering area of an image memory;

storing a plurality of polygons in a display rendering area of said image memory based on at least said texture images; ~~+~~ and

mapping the texture images respectively onto said polygons;
moving the texture images stored in said texture rendering area in an arbitrary direction and restoring the moved texture images in said texture rendering area; and

remapping the moved texture images respectively onto the polygons stored in said display rendering area.

wherein in said moving step, at least one of said plurality of semitransparent textures is moved in a different direction from another one of said plurality of textures.

Add the following new claims:

21. A method according to claim 1, wherein in said moving step, at least one of said plurality of semitransparent textures is moved in more than one direction.

22. A method according to claim 6, wherein in said moving step, at least one of said plurality of semitransparent textures is moved in more than one direction.

23. An apparatus according to claim 7, wherein said texture moving means moves at least one of said plurality of semitransparent textures in more than one direction.

24. An apparatus according to claim 12, wherein said texture moving means moves at least one of said plurality of semitransparent textures in more than one direction.

25. A recording medium according to claim 13, wherein in said moving step, at least one of said plurality of semitransparent textures is moved in more than one direction.

26. A recording medium according to claim 18, wherein in said moving step, at least one of said plurality of semitransparent textures is moved in more than one direction.

27. A program according to claim 19, wherein in said moving step, at least one of said plurality of semitransparent textures is moved in more than one direction.

28. A program according to claim 20, wherein in said moving step, at least one of said plurality of semitransparent textures is moved in more than one direction.

29. A method of rendering an image comprising the steps of:

mapping a plurality semitransparent textures onto respective surfaces of a plurality of semitransparent or transparent polygons which make up an object; and

moving said plurality of semitransparent textures simulatively in an arbitrary direction.

30. A method according to claim 29, wherein in said moving step, at least one of said plurality of semitransparent textures is moved in a different direction from another one of said plurality of textures.

31. A method according to claim 29, wherein said moving step further comprises the step of arranging said plurality of semitransparent or transparent polygons in one or more multiple layers.

32. A method of processing an image, comprising the steps of:

storing a plurality of texture images in a texture rendering area of an image memory;

storing a plurality of polygons in a display rendering area of said image memory based on at least said texture images;

mapping the texture images respectively onto said polygons;
and

moving the texture images stored in said texture rendering area in an arbitrary direction and restoring the moved texture images in said texture rendering area.

33. A method according to claim 32, wherein in said moving step, at least one of said plurality of semitransparent textures

is moved in a different direction from another one of said plurality of textures.

34. An apparatus for rendering an image comprising:

texture mapping means for mapping a plurality semitransparent textures onto respective surfaces of a plurality of semitransparent or transparent polygons which make up an object; and

texture moving means for moving said plurality of semitransparent textures simulatively in an arbitrary direction.

35. An apparatus according to claim 34, wherein said texture moving means moves at least one of said plurality of semitransparent textures in a different direction from another one of said plurality of textures.

36. An apparatus according to claim 34, wherein said rendering means comprises:

object setting means for arranging said plurality of semitransparent or transparent polygons in one or more multiple layers.

37. An apparatus for processing an image, comprising:

texture rendering means for storing a plurality of texture images in a texture rendering area of an image memory;

image rendering means for storing a plurality of polygons in a display rendering area of said image memory based on at least said texture images;

texture mapping means for mapping the texture images respectively onto said polygons; and

texture moving means for moving the texture images stored in said texture rendering area in an arbitrary direction and restoring the moved texture images in said texture rendering area.

38. An apparatus according to claim 37, wherein said texture moving means moves at least one of said plurality of semitransparent textures in a different direction from another one of said plurality of textures.

39. A recording medium storing a program and data, said program comprising the steps of:

mapping a plurality semitransparent textures onto respective surfaces of a plurality of semitransparent or transparent polygons which make up an object; and

moving said plurality of semitransparent textures simulatively in an arbitrary direction.

40. A recording medium according to claim 39, wherein in said moving step, at least one of said plurality of semitransparent textures is moved in a different direction from another one of said plurality of textures.

41. A recording medium according to claim 39, wherein said moving step further comprises the step of arranging said plurality of semitransparent or transparent polygons in one or more multiple layers.

42. A recording medium storing a program and data, said program comprising the steps of:

storing a plurality of texture images in a texture rendering area of an image memory;

storing a plurality of polygons in a display rendering area of said image memory based on at least said texture images;

mapping the texture images respectively onto said polygons;
and

moving the texture images stored in said texture rendering area in an arbitrary direction and restoring the moved texture images in said texture rendering area.

43. A recording medium according to claim 42, wherein in said moving step, at least one of said plurality of semitransparent textures is moved in a different direction from another one of said plurality of textures.

44. A program which can be read and executed by a computer, comprising the steps of:

mapping a plurality semitransparent textures onto respective surfaces of a plurality of semitransparent or transparent polygons which make up an object; and

moving said plurality of semitransparent textures simulatively in an arbitrary direction.

45. A program according to claim 44, wherein in said moving step, at least one of said plurality of semitransparent textures is moved in a different direction from another one of said plurality of textures.

46. A program comprising the steps of:

- storing a plurality of texture images in a texture rendering area of an image memory;
- storing a plurality of polygons in a display rendering area of said image memory based on at least said texture images;
- mapping the texture images respectively onto said polygons;
- and
- moving the texture images stored in said texture rendering area in an arbitrary direction and restoring the moved texture images in said texture rendering area.

47. A program according to claim 46, wherein in said moving step, at least one of said plurality of semitransparent textures is moved in a different direction from another one of said plurality of textures.